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DIALOG(R)File 351:Derwent WPI

010855324 **Image available**
WPI Acc No: 1996-352277/199635
XRPX Acc No: N96-297146
Exposure appts. for semiconductor device mfr. - uses step and repeat system to effect exposure by projecting pattern
Patent Assignee: CANON KK (CANO)
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 8167565	A	19960625	JP 94330956	A	19941209	199635	B
JP 3296528	B2	20020702	JP 94330956	A	19941209	200246	

Priority Applications (No Type Date): JP 94330956 A 19941209
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 8167565	A		8	H01L-021/027	
JP 3296528	B2		7	H01L-021/027	Previous Publ. patent JP 8167565

Abstract (Basic): JP 8167565 A
The appts. comprises an exposing device to project a pattern in a reticle on each exposure region by a step and repeat system to effect exposure. A display device graphically displays an exposure layout (405).
The exposure layout is displayed by a diagram (702) to indicate an actual exposure region the exposure range of which is limited by the masking blade.
ADVANTAGE - Has reliable and efficient operation.
Dwg.3/7
Title Terms: EXPOSE; APPARATUS; SEMICONDUCTOR; DEVICE; MANUFACTURE; STEP; REPEAT; SYSTEM; EFFECT; EXPOSE; PROJECT; PATTERN
Derwent Class: P84; U11
International Patent Class (Main): H01L-021/027
International Patent Class (Additional): G03F-007/20; G03F-009/00
File Segment: EPI; EngPI

(19)日本国特許庁（ＪＰ）　(12)**公開特許公報（A）**　(11)特許出願公開番号

特開平8－167565

(43)公開日　平成８年(1996)６月25日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｈ０１Ｌ　21/027				
Ｇ０３Ｆ　7/20	５２１			
9/00		Ｈ		
			Ｈ０１Ｌ　21/30　５１４　Ｃ	
			５０２　Ｇ	

審査請求　未請求　請求項の数４　ＦＤ　（全８頁）

(21)出願番号　特願平6－330956

(22)出願日　平成６年(1994)12月９日

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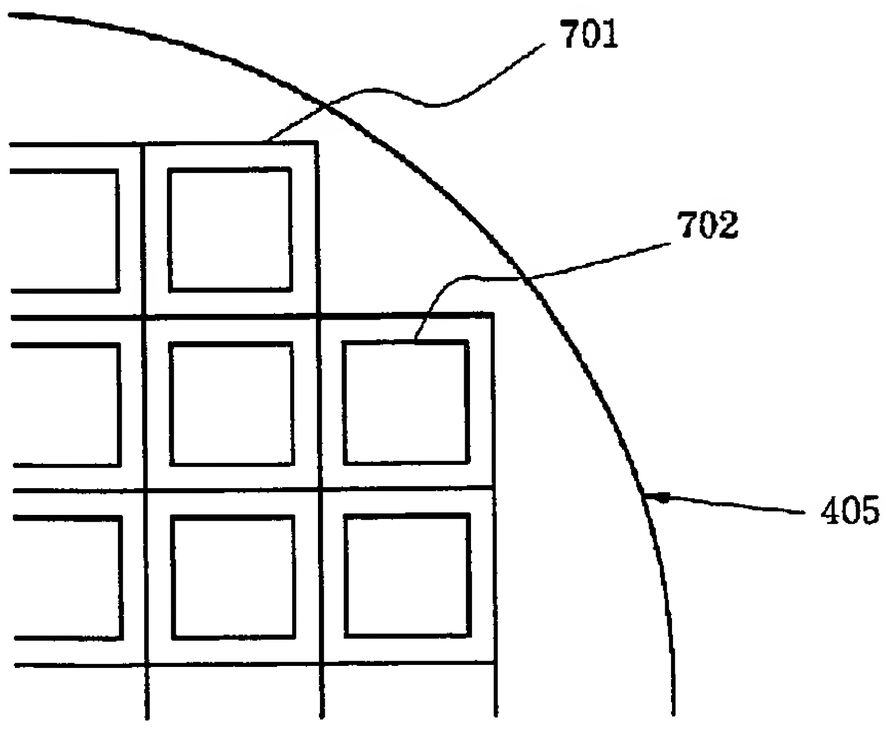
(54)【発明の名称】　半導体露光装置およびデバイス製造方法

(57)【要約】

【目的】　実際の露光領域を正確に示す露光レイアウトを表示できるようにする。

【構成】　ジョブ・パラメータに従い、露光範囲をマスキング・ブレードにより制限しつつレチクル上のパターンをステップ・アンド・リピート方式によってウエハ上の各露光領域に投影して露光する露光手段と、前記ジョブ・パラメータに基づいて前記各露光領域の配置を示す露光レイアウト４０５を図形表示する表示手段とを備えた半導体露光装置において、前記マスキング・ブレードにより露光範囲が制限される実際の露光領域を示す図形７０２により前記露光レイアウトを表示する。



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【特許請求の範囲】

【請求項１】　ジョブ・パラメータに従い、露光範囲をマスキング・ブレードにより制限しつつレチクル上のパターンをステップ・アンド・リピート方式によってウエハ上の各露光領域に投影して露光する露光手段と、前記ジョブ・パラメータに基づいて前記各露光領域の配置を示す露光レイアウトを図形表示する表示手段とを備えた半導体露光装置において、表示手段は前記マスキング・ブレードにより露光範囲が制限される実際の露光領域を示す図形により前記露光レイアウトを表示するものであることを特徴とする半導体露光装置。

【請求項２】　表示手段は、前記実際の露光領域の露光レイアウトに対し、ＸおよびＹ方向のステップピッチに対応した繰返しピッチを有する格子状もしくは碁盤目状の露光レイアウトを重ねて表示し、あるいはいずれかの露光レイアウトを選択的に表示するものであることを特徴とする請求項１記載の半導体露光装置。

【請求項３】　ジョブ・パラメータに従い、露光範囲をマスキング・ブレードにより制限しつつレチクル上のパターンをステップ・アンド・リピート方式によってウエハ上の各露光領域に順次投影して露光することにより半導体デバイスを製造するデバイス製造方法において、前記各露光領域の配置を示す露光レイアウトを、前記ジョブ・パラメータに基づいて、前記露光範囲が制限される実際の露光領域を示す図形により表示し、これを確認した後あるいは確認しつつ、前記露光を行なうことを特徴とするデバイス製造方法。

【請求項４】　露光レイアウトを表示するに際しては、オペレータが表示モードを指示し、これに従って、前記実際の露光領域の露光レイアウトに対し、ＸおよびＹ方向のステップピッチに対応した繰返しピッチを有する格子状もしくは碁盤目状の露光レイアウトを重ねて表示し、あるいはいずれかの露光レイアウトを選択的に表示するものであることを特徴とする請求項３記載の半導体露光装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明はウエハ上にステップ・アンド・リピート方式によって回路パターンを焼き付ける半導体露光装置およびデバイス製造方法に関する。

【０００２】

【従来の技術】従来、レチクル上の回路パターンを半導体ウエハ上にステップ・アンド・リピート方式により焼き付ける半導体露光装置においては、露光ジョブを実行するのに必要な種々のパラメータを補助記憶装置からロードし、あるいはオペレータがこれらパラメータを入力もしくは訂正し、そのパラメータに従ってジョブを実行するが、その際、ウエハ上に各ショット位置がどのように配置されるかを示す露光レイアウトをディスプレイ上に表示し、これによってオペレータが露光レイアウトを

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確認できるようになっている。そして、この露光レイアウトは、ジョブ・パラメータ中のウエハ・サイズ、ＸおよびＹ方向のステップ・ピッチ、ロー・コラム方向のショット数等に基づき、各ショットの配置が碁盤目状の図形として表示される。

【０００３】

【発明が解決しようとする課題】しかしながら、実際の各ショットにおける露光領域は、マスキング・ブレードの開口状態によって制限されるため、ステップ・ピッチにより区画される上述の碁盤目状のものは、必ずしも各露光領域を正しく反映したものとは言えない場合がある。したがって、ディスプレイ上に表示された露光レイアウトから予想されるものと、実際に焼き付けられるものとはかなり異なるといった事態が生じ得るという問題がある。

【０００４】本発明の目的は、このような従来技術の問題点に鑑み、半導体露光装置あるいはそれを用いたデバイス製造方法において、実際の露光領域を正確に示す露光レイアウトを表示できるようにし、もって、半導体デバイス製造におけるより確実かつ効率的なオペレーションを可能にすることにある。

【０００５】

【課題を解決するための手段】この目的を達成するため本発明の装置は、ジョブ・パラメータに従い、露光範囲をマスキング・ブレードにより制限しつつレチクル上のパターンをステップ・アンド・リピート方式によってウエハ上の各露光領域に投影して露光する露光手段と、前記ジョブ・パラメータに基づいて前記各露光領域の配置を示す露光レイアウトを図形表示する表示手段とを備えた半導体露光装置において、表示手段は前記マスキング・ブレードにより露光範囲が制限される実際の露光領域を示す図形により前記露光レイアウトを表示するものであることを特徴とする。

【０００６】また、本発明の方法は、ジョブ・パラメータに従い、露光範囲をマスキング・ブレードにより制限しつつレチクル上のパターンをステップ・アンド・リピート方式によってウエハ上の各露光領域に順次投影して露光することにより半導体デバイスを製造するデバイス製造方法において、前記各露光領域の配置を示す露光レイアウトを、前記ジョブ・パラメータに基づいて、前記露光範囲が制限される実際の露光領域を示す図形により表示し、これを確認した後あるいは確認しつつ、前記露光を行なうことを特徴とする。

【０００７】ここで、前記実際の露光領域の露光レイアウトに対し、ＸおよびＹ方向のステップピッチに対応した繰返しピッチを有する格子状もしくは碁盤目状の露光レイアウトを重ねて表示し、あるいはいずれかの露光レイアウトを選択的に表示するようにしてもよい。

【０００８】

【作用】この構成において、露光ジョブを実行するため

に必要な各種ジョブ・パラメータは、補助記憶装置に記憶されており、ジョブ実行時にロードされ、あるいはオペレータがこれらパラメータをエディットしもしくは設定することもできる。そして、これらジョブ・パラメータ中のステップ・ピッチ、ショット数等に関する情報に基づいて格子状の露光レイアウトを表示することができるが、マスキング・ブレードにより制限された実際の露光領域の状態を示す露光レイアウトは、例えば、ショット中心座標に対する各マスキング・ブレードの位置に関する情報を用いて表示される。

【０００９】このようにして表示される露光レイアウトの画面は、露光を開始する前に、あるいは露光開始後においても、適宜参照され、それによりオペレータは実際に露光される状態を正しく認識し、確実かつ効率的なオペレーションによる半導体デバイスの製造を行なうことができる。

【００１０】

【実施例】図１は本発明の一実施例に係る半導体露光装置の外観を示す斜視図である。同図に示すように、この半導体露光装置は、装置本体の環境温度制御を行なう温調チャンバ１０１、その内部に配置され、装置本体の制御を行うＣＰＵを有するＥＷＳ本体１０６、ならびに、装置における所定の情報を表示するＥＷＳ用ディスプレイ装置１０２、装置本体において撮像手段を介して得られる画像情報を表示するモニタＴＶ１０５、装置に対し所定の入力を行うための操作パネル１０３、ＥＷＳ用キーボード１０４等を含むコンソール部を備えている。図中、１０７はＯＮ－ＯＦＦスイッチ、１０８は非常停止スイッチ、１０９は各種スイッチ、マウス等、１１０はＬＡＮ通信ケーブル、１１１はコンソール機能からの発熱の排気ダクト、そして１１２はチャンバの排気装置である。半導体露光装置本体はチャンバ１０１の内部に設置される。

【００１１】ＥＷＳ用ディスプレイ１０２は、ＥＬ、プラズマ、液晶等の薄型フラットタイプのものであり、チャンバ１０１前面に納められ、ＬＡＮケーブル１１０によりＥＷＳ本体１０６と接続される。操作パネル１０３、キーボード１０４、モニタＴＶ１０５等もチャンバ１０１前面に設置し、チャンバ１０１前面から従来と同様のコンソール操作が行なえるようにしてある。

【００１２】図２は、図１の装置の内部構造を示す図である。同図においては、半導体露光装置としてのステッパが示されている。図中、２０２はレチクル、２０３はウエハであり、光源装置２０４から出た光束が照明光学系２０５を通ってレチクル２０２を照明するとき、投影レンズ２０６によりレチクル２０２上のパターンをウエハ２０３上の感光層に転写することができる。レチクル２０２はレチクル２０２を保持、移動するためのレチクルステージ２０７により支持されている。ウエハ２０３はウエハチャック２９１により真空吸着された状態で露光される。ウエハチャック２９１はウエハステージ２０９により各軸方向に移動可能である。レチクル２０２の上側にはレチクルの位置ずれ量を検出するためのレチクル光学系２８１が配置される。ウエハステージ２０９の上方に、投影レンズ２０６に隣接してオフアクシス顕微鏡２８２が配置されている。オフアクシス顕微鏡２８２は内部の基準マークとウエハ２０３上のアライメントマークとの相対位置検出を行なうのが主たる役割である。また、これらステッパ本体に隣接して周辺装置であるレチクルライブラリ２２０やウエハキャリアエレベータ２３０が配置され、必要なレチクルやウエハはレチクル搬送装置２２１およびウエハ搬送装置２３１によってステッパ本体に搬送される。

【００１３】チャンバ１０１は、主に空気の温度調節を行なう空調機室２１０および微小異物を濾過し清浄空気の均一な流れを形成するフィルタボックス２１３、また装置環境を外部と遮断するブース２１４で構成されている。チャンバ１０１内では、空調機室２１０内にある冷却器２１５および再熱ヒーター２１６により温度調節された空気が、送風機２１７によりエアフィルタｇを介してブース２１４内に供給される。このブース２１４に供給された空気はリターンロｒａより再度空調機室２１０に取り込まれチャンバ１０１内を循環する。通常、このチャンバ１０１は厳密には完全な循環系ではなく、ブース２１４内を常時陽圧に保つため循環空気量の約１割のブース２１４外の空気を空調機室２１０に設けられた外気導入口ｏａより送風機を介して導入している。このようにしてチャンバ１０１は本装置の置かれる環境温度を一定に保ち、かつ空気を清浄に保つことを可能にしている。また光源装置２０４には超高圧水銀灯の冷却やレーザ異常時の有毒ガス発生に備えて吸気口ｓａと排気口ｅａが設けられ、ブース２１４内の空気の一部が光源装置２０４を経由し、空調機室２１０に備えられた専用の排気ファンを介して工場設備に強制排気されている。また、空気中の化学物質を除去するための化学吸着フィルタｃｆを、空調機室２１０の外気導入口ｏａおよびリターンロｒａにそれぞれ接続して備えている。

【００１４】図３は、図１の装置の電気回路構成を示すブロック図である。同図において、３２１は装置全体の制御を司る、前記ＥＷＳ本体１０６に内蔵された本体ＣＰＵであり、マイクロコンピュータまたはミニコンピュータ等の中央演算処理装置からなる。３２２はウエハステージ駆動装置、３２３は前記オフアクシス顕微鏡２８２等のアライメント検出系、３２４はレチクルステージ駆動装置、３２５は前記光源装置２０４等の照明系、３２６はシャッタ駆動装置、３２７はフォーカス検出系、３２８はＺ駆動装置であり、これらは、本体ＣＰＵ３２１により制御される。３２９は前記レチクル搬送装置２２１、ウエハ搬送装置２３１等の搬送系である。３３０は前記ディスプレイ１０２、キーボード１０４等を有す

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るコンソールユニットであり、本体ＣＰＵ３２１にこの露光装置の動作に関する各種のコマンドやパラメータを与えるためのものである。すなわち、オペレータとの間で情報の授受を行うためのものである。３３１はコンソールＣＰＵ、３３２は各種ジョブのパラメータ等を記憶する外部メモリである。ジョブパラメータには、使用するマスク、マスキングブレードの開口、露光量、レイアウトデータ等が含まれる。

【００１５】図４は図１の装置におけるディスプレイ１０２上に表示されるジョブ選択画面での露光レイアウト表示の概念を示す図であり、図５はジョブ選択コマンドを実行した場合の処理を示すフローチャートである。これらの図を参照してジョブ選択時の動作を説明する。

【００１６】ディスプレイ１０２に表示された上位の操作画面においてジョブ選択コマンドが指示されると、コンソールＣＰＵ３３１は、ステップＳ５０１において、ジョブ選択画面４０１に切り換え、ジョブA，B，C…のリストを表示する。次に、ステップＳ５０２において、リスト中のジョブA，B，C…のうちいずれかのジョブの指示がなされるか、あるいはスクロールボタン４１０が指示されるかを判定し、ジョブの指示があるとステップＳ５０３へ移行する。スクロールボタン４１０が指示された場合はステップＳ５０１へ戻り、ジョブリストをスクロールさせる。これらの指示はマウスやキーボードにより、あるいはディスプレイがタッチスクリーンを有する場合はタッチすることにより行なうことができる。

【００１７】ステップＳ５０３では、外部メモリ３３２より読み出した、ステップＳ５０２において指示されたジョブに対応するジョブ・パラメータ中のレイアウトデータおよびマスキング・ブレードの開口に関するデータに基づいて、露光レイアウト４０５をジョブリストA，B，C…の左方に表示する。レイアウトデータは、X，Y方向のステップサイズ、トータルショット数、各ショットの中心座標、ウエハサイズ等の情報を含むものである。

【００１８】次に、ステップＳ５０４において、ロードボタン４１１が指示されるか否かを判定し、ロードボタン４１１が指示された場合はステップＳ５０６へ移行し、スクロールボタン４１０が操作された場合はステップＳ５０１へ戻ってジョブリストのスクロールを行なう。ステップＳ５０６では、ステップＳ５０２で指示されたジョブのパラメータをハードディスク３３２よりメモリ４０３へロードする。そして、ステップＳ５０６では終了ボタン４１２が指示されるかを判定し、これが指示された場合はジョブ選択コマンドを終了して上位の操作画面へ戻る。スクロールボタン４１０が操作された場合はステップＳ５０１へ戻る。このようにして、露光レイアウトを確認しながら複数のジョブパラメータ４０６，４０７…をロードすることができる。

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【００１９】上位の操作画面では、ロードしたジョブパラメータに基くジョブ（露光処理）の起動等のコマンドを指示することができる。ジョブが起動されると、必要なジョブパラメータが本体ＣＰＵのメモリ４０２に転送される。

【００２０】図６は、図５のフローチャートのステップＳ５０３におけるレイアウト表示処理を示すフローチャートである。レイアウト表示処理においては、図６に示すように、まずステップＳ６０１において露光レイアウトをA，B，Cいずれの表示モードで表示するかを指定するための入力を受け入れる。モードAは、図７に部分的に示すように、XおよびY方向のステップ・ピッチに対応した繰返しピッチを有する格子状の露光レイアウト７０１を表示するモードである。モードBはマスキング・ブレードにより露光範囲が制限された実際の露光領域に対応する図形による露光レイアウト７０２を表示するモードである。また、モードCはこれら露光レイアウト７０１および７０２を重ねて表示するモードである。

【００２１】次に、ステップＳ６０２において、指定された表示モードがA，B，Cのいずれであるかを判定し、モードAの場合は、ステップＳ６０３へ進み、ステップ・サイズ、トータルショット数、ウエハ・サイズ等に基づいて、露光レイアウト７０１を表示する。またモードBの場合は、各ショットの中心座標、マスキング・ブレードの開口に関するデータ等に基づき、露光レイアウト７０２を表示する。モードCの場合は、露光レイアウト７０１および７０２を重ねて表示する。マスキング・ブレードの開口に関するデータとは例えば、矩形の開口を形成してX，Y方向の露光範囲を制限する４つのブレードそれぞれへのショット中心からの距離を示すものである。

【００２２】なお、露光レイアウト７０１および７０２は、オペレータの指示に基づき、任意に切り替えて表示するようにしても良い。また、カラー表示が可能な場合は、露光レイアウト７０１および７０２を異なる色で重ねて表示するようにしても良い。

【００２３】

【発明の効果】以上説明したように本発明によれば、マスキング・ブレードにより制限された実際の露光領域を示す図形による露光レイアウトを表示するようにしたため、オペレータは実際の露光領域がどのように配置されるかを容易に把握することができる。したがって、確実かつ効率的なオペレーションを行うことができ、半導体デバイス製造の効率を向上させることができる。

【図面の簡単な説明】

【図１】　本発明の一実施例に係る半導体露光装置の外観を示す斜視図である。

【図２】　図１の装置の内部構造を示す図である。

【図３】　図１の装置の電気回路構成を示すブロック図である。

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【図４】　図１の装置におけるジョブ選択画面での露光レイアウト表示の概念を示す図である。

【図５】　図１の装置においてジョブ選択コマンドを実行した場合の処理を示すフローチャートである。

【図６】　図５のフローチャートにおけるレイアウト表示処理を示すフローチャートである。

【図７】　図６の処理において表示される露光レイアウトの部分図である。

【符号の説明】

１０１：温調チャンバ、１０２：ＥＷＳ用ディスプレイ装置、１０３：操作パネル、１０４　ＥＷＳ用キーボード、１０５：モニタＴＶ、１０６：ＥＷＳ本体、１０７：ＯＮ－ＯＦＦスイッチ、１０８：非常停止スイッチ、１０９：各種スイッチ、マウス等、１１０：ＬＡＮ通信ケーブル、１１１：排気ダクト、１１２：排気装

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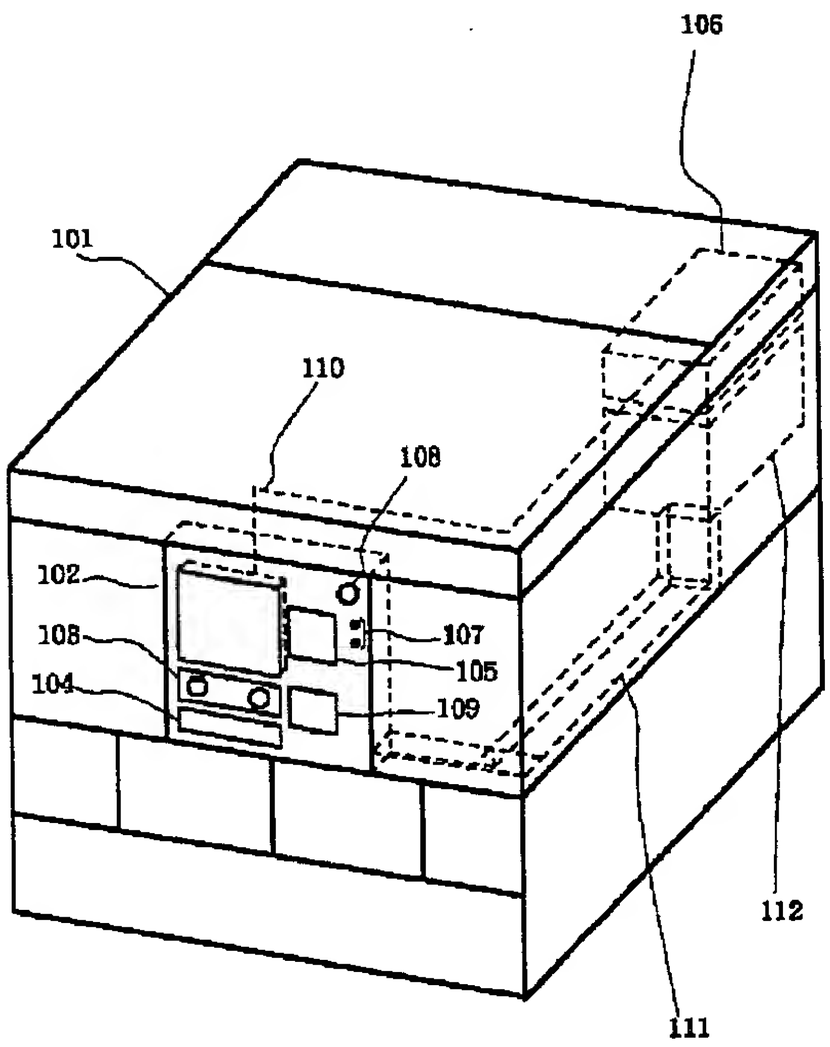
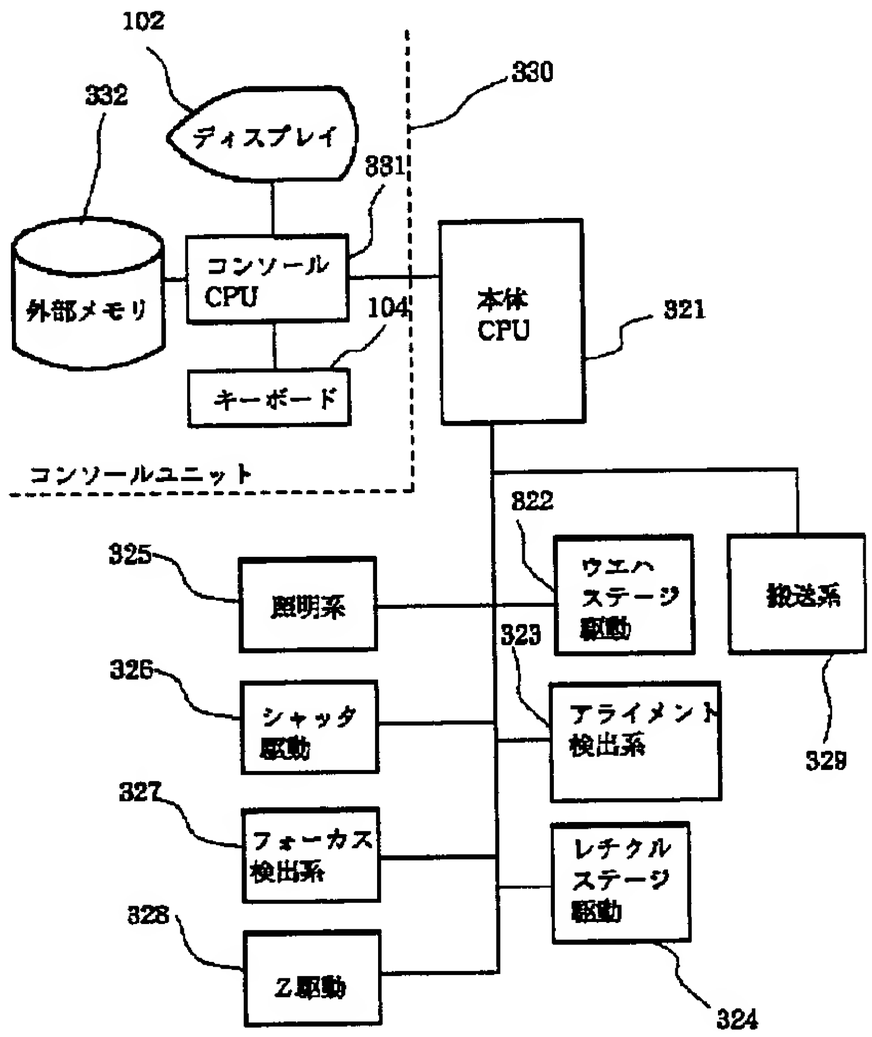
置、２０２：レチクル、２０３：ウエハ、２０４：光源装置、２０５：照明光学系、２０６：投影レンズ、２０７：レチクルステージ、２０９：ウエハステージ、２８１：レチクル顕微鏡、２８２：オフアクシス顕微鏡、２１０：空調機室、２１３：フィルタボックス、２１４：ブース、２１７：送風機、ｇ：エアフィルタ、ｃｆ：化学吸着フィルタ、ｏａ：外気導入口、ｒａ：リターン口、３１２：キーボード、３２１：本体ＣＰＵ、３３０：コンソール、３３１：コンソールＣＰＵ、３３２：外部メモリ、４０１：ジョブ選択画面、４０２，４０３：メモリ、４０５：露光レイアウト、４０６，４０７：ジョブパラメータ、４１０：スクロールボタン、４１１：ロードボタン、４１２：終了ボタン、７０１：ステップ・ピッチによる格子状露光レイアウト、７０２：マスキング・ブレード対応露光レイアウト。

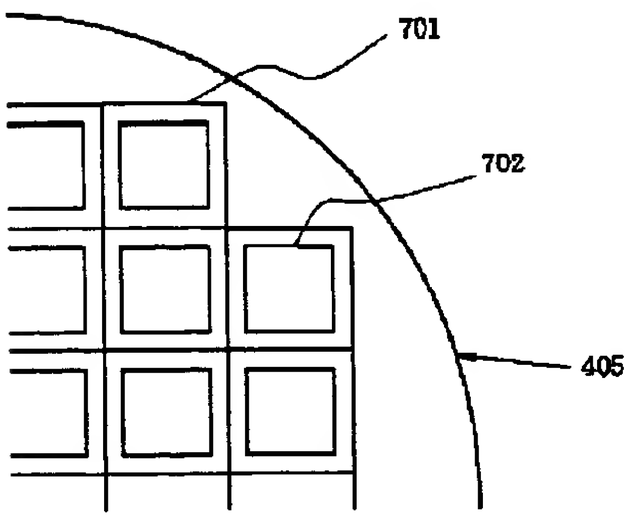
【図１】



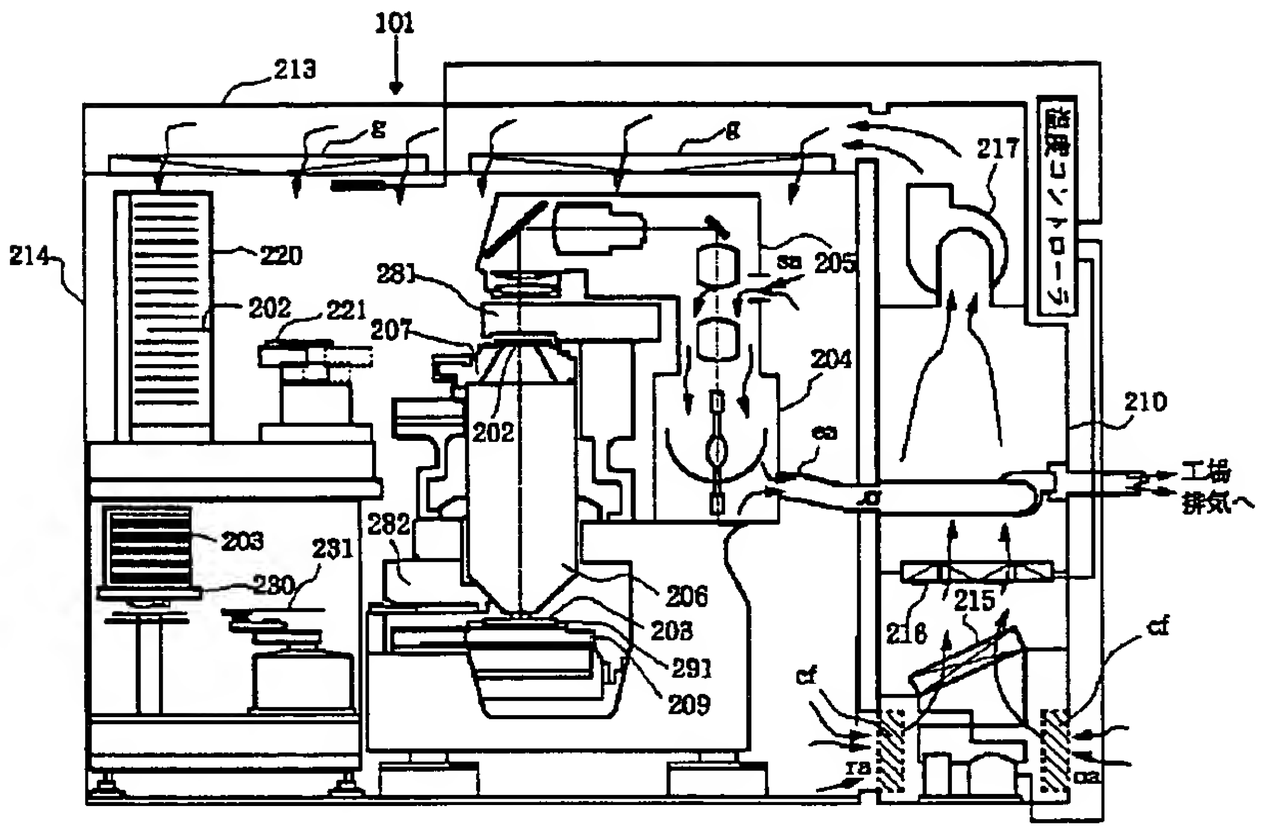
【図３】



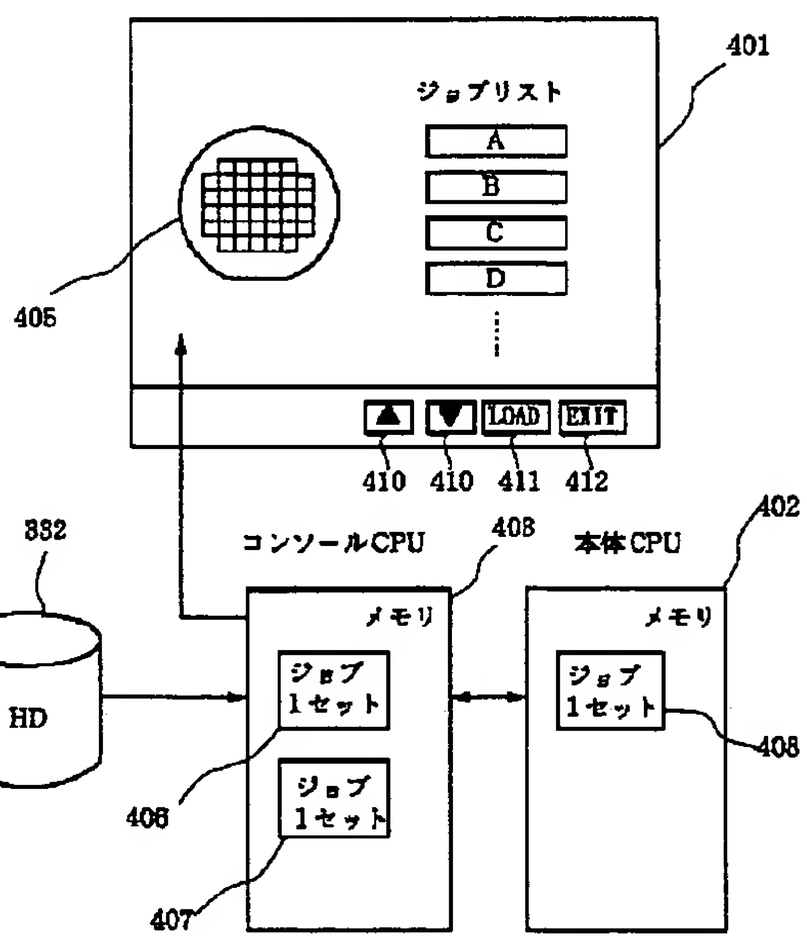
【図７】



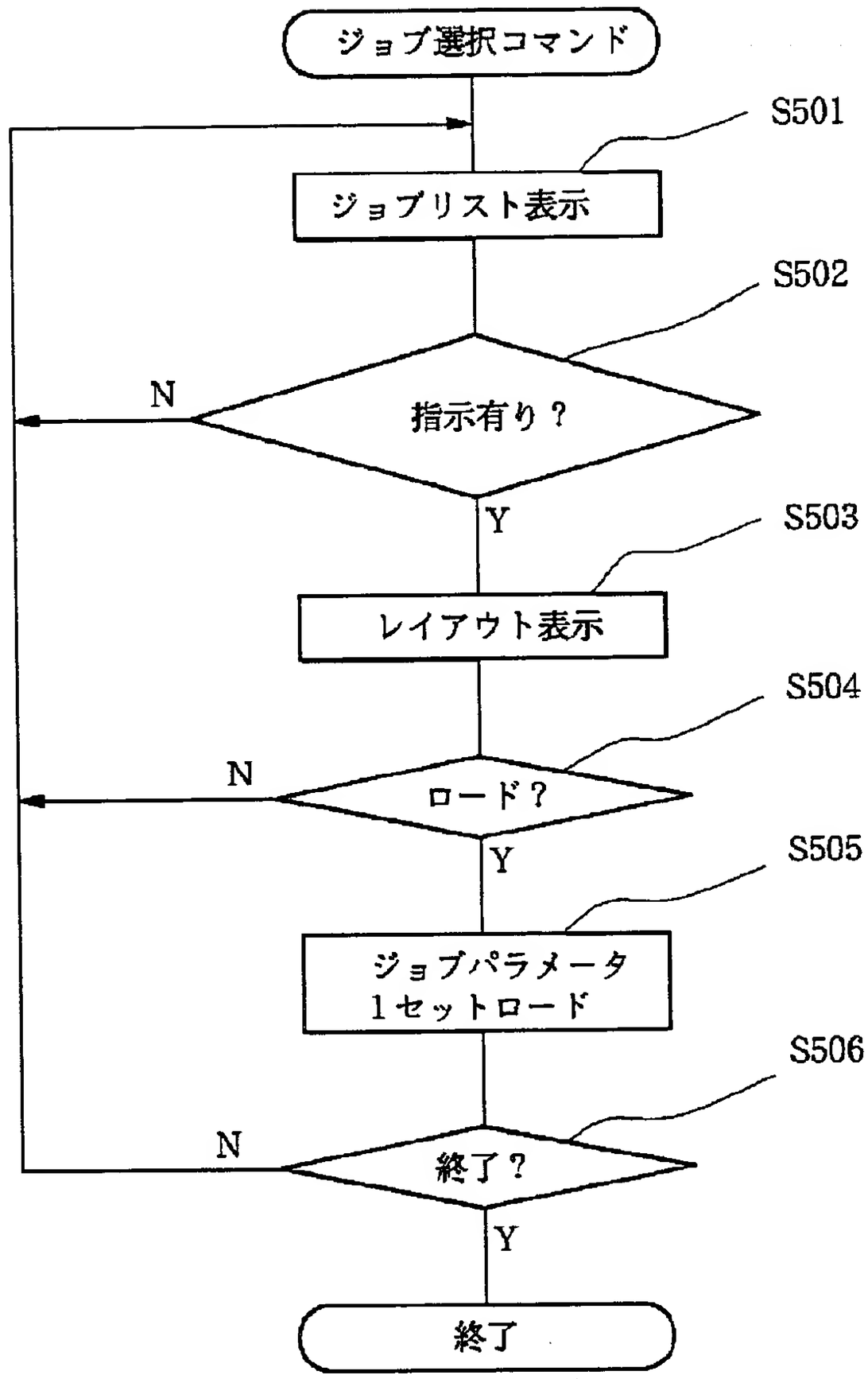
【図2】


101
213
217
214
220
202
221
281
207
205
204
210
202
282
203
231
230
206
208
291
209
215
216
cf
工場
排気へ

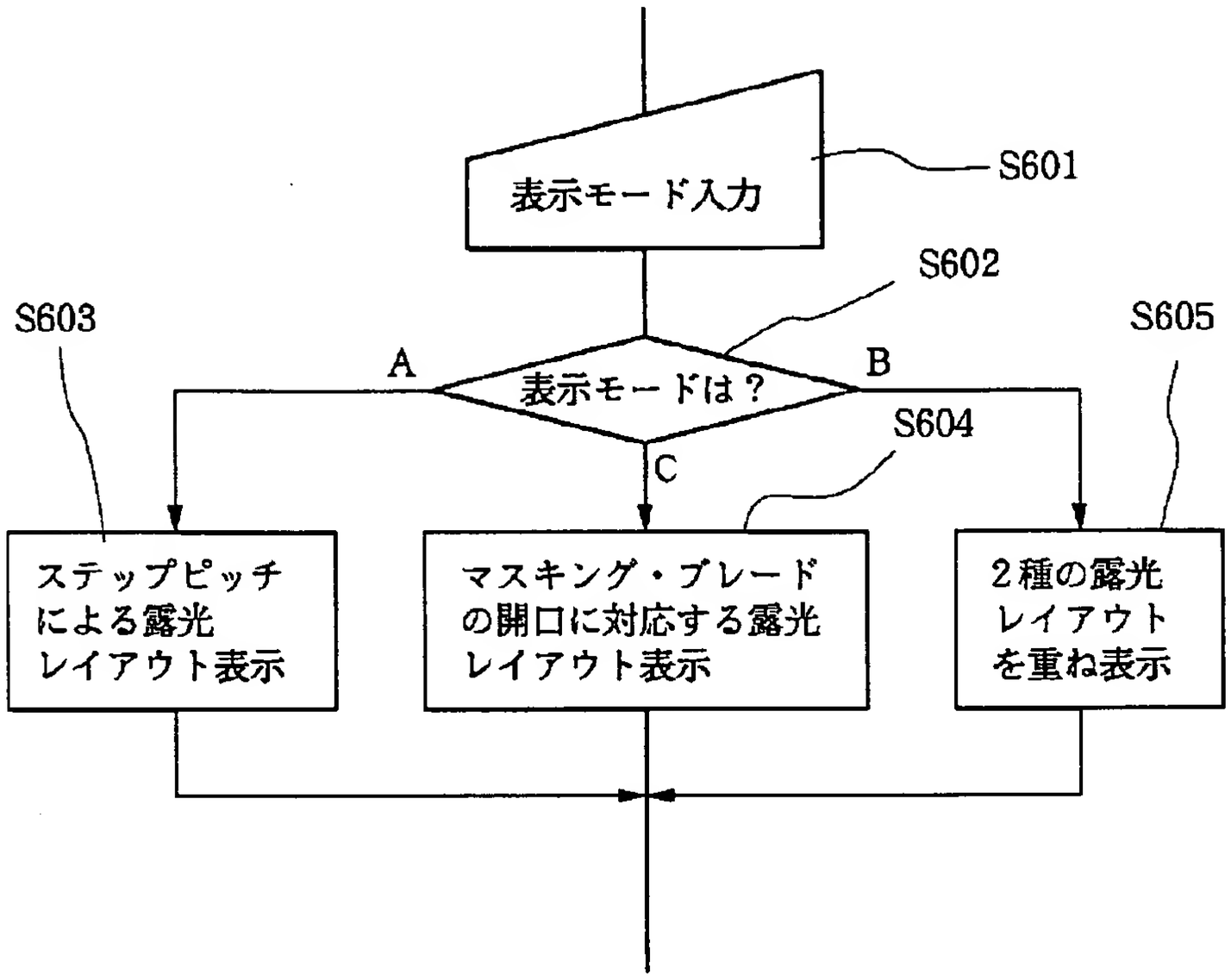
【図4】


401
ジョブリスト
A
B
C
D
405
LOAD
EXIT
410
410
411
412
402
コンソールCPU
408
本体CPU
メモリ
メモリ
ジョブ
1セット
ジョブ
1セット
ジョブ
1セット
HD
332
406
407
408

【図５】


ジョブ選択コマンド
S501
ジョブリスト表示
S502
指示有り？
N
Y
S503
レイアウト表示
S504
ロード？
N
Y
S505
ジョブパラメータ
1セットロード
S506
終了？
N
Y
終了

【図６】


表示モード入力
S601
S602
S603
S605
A
B
表示モードは？
S604
C
ステップピッチ
による露光
レイアウト表示
マスキング・ブレード
の開口に対応する露光
レイアウト表示
２種の露光
レイアウト
を重ね表示

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] An exposure means to project the pattern on a reticle on each exposure field on a wafer, and to expose it with a step-and-repeat method according to a job parameter, a masking blade restricting the exposure range, In the semi-conductor aligner equipped with the display means which carries out the graphic display of the exposure layout which shows arrangement of each of said exposure field based on said job parameter A display means is a semi-conductor aligner characterized by being what displays said exposure layout with the graphic form in which the actual exposure field where the exposure range is restricted by said masking blade is shown.
[Claim 2] A display means is a semi-conductor aligner according to claim 1 which displays in piles the shape of a grid and the exposure layout in a grid pattern corresponding to a step pitch of X and the direction of Y which has a pitch repeatedly to the exposure layout of said actual exposure field, and is characterized by being a certain thing which is, can creep and displays that exposure layout alternatively.
[Claim 3] In the device manufacture approach of manufacturing a semiconductor device by carrying out sequential projection and exposing the pattern on a reticle to each exposure field on a wafer with a step-and-repeat method according to a job parameter, a masking blade restricting the exposure range The device manufacture approach characterized by performing said exposure, checking after displaying with the graphic form in which the actual exposure field where said exposure range is restricted in the exposure layout which shows arrangement of each of said exposure field based on said job parameter is shown and checking this.
[Claim 4] The semi-conductor aligner according to claim 3 which it faces displaying an exposure layout, and an operator directs a display mode, displays in piles the shape of a grid and the exposure layout in a grid pattern corresponding to a step pitch of X and the direction of Y which has a pitch repeatedly to the exposure layout of said actual exposure field according to this, and is characterized by to be a certain thing which is, can creep and displays that exposure layout alternatively.

[Translation done.]

.DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the semi-conductor aligner and the device manufacture approach which can be burned in a circuit pattern with a step-and-repeat method on a wafer.
[0002]
[Description of the Prior Art] In the semi-conductor aligner which can be conventionally burned with a step-and-repeat method on a semi-conductor wafer in the circuit pattern on a reticle Although various parameters required to perform an exposure job are loaded from an auxiliary storage unit, or an operator inputs or corrects these parameters and a job is performed according to the parameter In that case, the exposure layout which shows how each shot location is arranged on a wafer is displayed on a display, and an operator can check an exposure layout now by this. And this exposure layout is displayed based on the wafer size in a job parameter, X and the step pitch of the direction of Y, the shots per hour of the direction of a low column, etc. as a graphic form with arrangement of each shot in a grid pattern.
[0003]
[Problem(s) to be Solved by the Invention] However, since the exposure field in each actual shot is restricted according to the opening condition of a masking blade, the above-mentioned thing in a grid pattern divided with a step pitch may necessarily be unable to be called what reflected each exposure field correctly. Therefore, there is a problem that the situation of differing from what is expected from the exposure layout displayed on the display, and the thing which can actually be burned considerably may arise.
[0004] In view of the trouble of such a conventional technique, in a semi-conductor aligner or the device manufacture approach using it, the purpose of this invention enables it to display the exposure layout which shows an actual exposure field correctly, has it, and it is to make certain and efficient operation possible rather than it can set to semiconductor device manufacture.
[0005]
[Means for Solving the Problem] In order to attain this purpose, the equipment of this invention follows a job parameter. An exposure means to project the pattern on a reticle on each exposure field on a wafer, and to expose it with a step-and-repeat method, a masking blade restricting the exposure range, In the semi-conductor aligner equipped with the display means which carries out the graphic display of the exposure layout which shows arrangement of each of said exposure field based on said job parameter It is characterized by a display means being what displays said exposure layout with the graphic form in which the actual exposure field where the exposure range is restricted by said masking blade is shown.
[0006] Moreover, the approach of this invention follows a job parameter. In the device manufacture approach of manufacturing a semiconductor device by carrying out sequential projection and exposing the pattern on a reticle to each exposure field on a wafer with a step-and-repeat method, a masking blade restricting the exposure range It is characterized by performing said exposure, checking, after displaying with the graphic form in which the actual exposure field where said exposure range is restricted in the exposure layout which shows arrangement of each of said exposure field based on said job parameter is shown and checking this.
[0007] The shape of a grid and the exposure layout in a grid pattern corresponding to a step pitch of X and the direction of Y which has a pitch repeatedly is displayed in piles to the exposure layout of said actual exposure field, it can creep [can be,] here, and you may make it display that exposure layout alternatively.
[0008]
[Function] In this configuration, the auxiliary storage unit memorizes, and it can be loaded at the time of job activation, an operator can edit these parameters, or various job parameters required in order to perform an exposure job can also set them up. And although a grid-like exposure layout can be displayed based on the information about the step pitch in these job parameter, a shots per hour, etc., the exposure layout which shows the condition of the actual exposure field restricted by the masking blade is displayed using the information about the location of each masking blade for example, to a shot core coordinate.
[0009] Thus, before the screen of the exposure layout displayed starts exposure, it is suitably referred to after exposure initiation, and thereby, an operator can recognize correctly the condition of actually being exposed and can manufacture the semiconductor device by certain and efficient operation.
[0010]
[Example] Drawing 1 is the perspective view showing the appearance of the semi-conductor aligner concerning one example of this invention. As shown in this drawing, this semi-conductor aligner is arranged to the temperature control

chamber 101 which performs environmental temperature control of the body of equipment, and its interior. In the EWS body 106 and row which have CPU which controls the body of equipment In the display unit 102 for EWS and the body of equipment which display the predetermined information in equipment It has the console section containing the control panel 103 for performing a predetermined input to the monitor TV 105 which displays the image information obtained through an image pick-up means, and equipment, and the keyboard 104 grade for EWS. For an emergency stop switch and 109, as for a LAN telecommunication cable and 111, 110, such as various switches and a mouse, is [107 / an ON-OFF switch and 108 / the jet pipe of generation of heat from a console function and 112] the exhausters of a chamber among drawing. The body of a semi-conductor aligner is installed in the interior of a chamber 101.
[0011] The display 102 for EWS is a thing thin flat type [, such as EL, plasma, and liquid crystal,], is dedicated to chamber 101 front face, and is connected with the EWS body 106 by the LAN cable 110. A control panel 103, a keyboard 104, and monitor TV105 grade are also installed in chamber 101 front face, and enable it to have performed the same console actuation as usual from chamber 101 front face.
[0012] Drawing 2 is drawing showing the internal structure of the equipment of drawing 1 . The stepper as a semi-conductor aligner is shown in this drawing. Among drawing, a reticle and 203 are wafers, and 202 can imprint the pattern on a reticle 202 in the sensitization layer on a wafer 203 with the projection lens 206, when the flux of light which came out of light equipment 204 illuminates a reticle 202 through the illumination-light study system 205. The reticle 202 is supported by the reticle stage 207 for holding a reticle 202 and moving. A wafer 203 is exposed after vacuum adsorption has been carried out by the wafer chuck 291. The wafer chuck 291 is movable to each shaft orientations by the wafer stage 209. The reticle optical system 281 for detecting the amount of location gaps of a reticle is arranged at the reticle 202 bottom. The projection lens 206 is adjoined above the wafer stage 209, and the off axis microscope 282 is arranged. It is a main role that the off axis microscope 282 performs relative-position detection with an internal reference mark and the alignment mark on a wafer 203. Moreover, these stepper body is adjoined, the reticle library 220 and the wafer carrier elevator 230 which are a peripheral device are arranged, and a required reticle and a required wafer are conveyed by the reticle transport device 221 and the wafer transport device 231 at a stepper body.
[0013] The chamber 101 consists of a filter box 213 which filters the air-conditioning cabin 210 and minute foreign matter which mainly perform temperature control of air, and forms the uniform flow of clarification air, and a booth 214 which intercepts an equipment environment with the exterior. Within a chamber 101, the air by which temperature control was carried out at the condensator 215 and the reheat heater 216 in the air-conditioning cabin 210 is supplied in a booth 214 through an air filter g by the blower 217. From the return opening ra, the air supplied to this booth 214 is incorporated again in the air-conditioning cabin 210, and circulates through the inside of a chamber 101. Usually, strictly, this chamber 101 has introduced the air outside the booth 214 of about ten percent of circulating air volume through a blower from the open air inlet oa in which it was prepared in the air-conditioning cabin 210 in order to always maintain the inside of not the perfect circulatory system but the booth 214 at positive pressure. Thus, it makes it possible for a chamber 101 to keep constant the environmental temperature on which this equipment is put, and to maintain air at clarification. Moreover, in preparation for cooling of an ultrahigh pressure mercury lamp, or toxic gas generating at the time of laser abnormalities, Inlet sa and an exhaust port ea are established in light equipment 204, and the forcible exhaust air of a part of air in a booth 214 is carried out via light equipment 204 at the plant through the ventilating fan of the dedication with which the air-conditioning cabin 210 was equipped. Moreover, it connected with the open air inlet oa and the return opening ra of the air-conditioning cabin 210, respectively, and they are equipped with the chemisorption filter cf for removing the chemical in air.
[0014] Drawing 3 is the block diagram showing the electrical circuit configuration of the equipment of drawing 1 . In this drawing, 321 is the body CPU which manages control of the whole equipment and which was built in said EWS body 106, and consists of arithmetic and program control, such as a microcomputer or a minicomputer. 322 -- for a reticle stage driving gear and 325, as for a shutter driving gear and 327, the illumination system of said light equipment 204 grade and 326 are [a wafer stage driving gear and 323 / the alignment detection system of said off axis microscope 282 grade, and 324 / a focal detection system and 328] Z driving gears, and these are controlled by the body CPU 321. 329 is the conveyance system of said reticle transport device 221 and wafer transport-device 231 grade. 330 is a console unit which has said display 102 and keyboard 104 grade, and is for giving various kinds of commands and parameters about actuation of this aligner to a body CPU 321. That is, it is for delivering and receiving information among operators. It is external memory 331 remembers Console CPU and 332 remembers the parameter of various jobs etc. to be. The mask to be used, opening of a masking blade, light exposure, layout data, etc. are contained in a job parameter.
[0015] Drawing 4 is drawing showing the concept of the exposure layout display in the job selection screen displayed on the display 102 in the equipment of drawing 1 , and drawing 5 is a flow chart which shows the processing at the

·time of executing a job selection command. With reference to these drawings, the actuation at the time of job selection is explained.

[0016] When a job selection command is directed in the actuation screen of the high order displayed on the display 102, in step S501, it switches to the job selection screen 401, and consoles CPU 331 are Jobs A, B, and C. -- A list is displayed. Next, in step S502, if it judges [of the jobs A and B under list, and C--] whether directions of one of jobs are made inside, or a scroll button 410 is directed and there are directions of a job, it will shift to step S503. When a scroll button 410 is directed, return and a job list are scrolled to step S501. These directions can be performed a mouse, a keyboard, or by touching, when a display has a touch screen.

[0017] At step S503, it is based on the layout data in the job parameter corresponding to the job which was read from external memory 332 and which was directed in step S502, and the data about opening of a masking blade, and they are the job lists A, B, and C about the exposure layout 405. -- It displays on a left. Layout data include information, such as a main coordinate of each [the step size of X and the direction of Y, a total shots per hour and] shot, and wafer size.

[0018] Next, in step S504, it judges whether the load carbon button 411 is directed, when the load carbon button 411 is directed, it shifts to step S506, and when a scroll button 410 is operated, it returns to step S501 and a job list is scrolled. At step S506, the parameter of the job directed at step S502 is loaded to memory 403 from a hard disk 332. And at step S506, when it judges whether the termination carbon button 412 is directed and this is directed, a job selection command is ended and it returns to the actuation screen of a high order. When a scroll button 410 is operated, it returns to step S501. Thus, two or more job parameter 406,407 -- can be loaded, checking an exposure layout.

[0019] On the actuation screen of a high order, commands, such as starting of the job (exposure processing) based on the loaded job parameter, can be directed. Starting of a job transmits a required job parameter to the memory 402 of Body CPU.

[0020] Drawing 6 is a flow chart which shows the layout display processing in step S503 of the flow chart of drawing 5 . layout display processing is shown in drawing 6 -- as -- first -- step S601 -- setting -- an exposure layout -- A, B, and C -- the input for specifying whether it displays with which display mode is accepted. Mode A is the mode which displays the exposure layout 701 of the shape of a grid corresponding to the step pitch of X and the direction of Y which has a pitch repeatedly, as partially shown in drawing 7 . Mode B is the mode which displays the exposure layout 702 with the graphic form corresponding to the actual exposure field to which the exposure range was restricted by the masking blade. Moreover, Mode C is the mode which displays these exposure layouts 701 and 702 in piles.

[0021] Next, in step S602, it judges any of A, B, and C the specified display modes are, and in the case of Mode A, it progresses to step S603, and it displays the exposure layout 701 based on step size, total shots-per-hour, and wafer size etc. Moreover, in the case of Mode B, the exposure layout 702 is displayed based on the data about the main coordinate of each shot, and opening of a masking blade etc. In the case of Mode C, the exposure layouts 701 and 702 are displayed in piles. The data about opening of a masking blade show the distance from the shot core to each of four blades which form rectangular opening and restrict the exposure range of X and the direction of Y.

[0022] In addition, the exposure layouts 701 and 702 are changed to arbitration, and you may make it display them based on directions of an operator. Moreover, when color display is possible, you may make it express the exposure layouts 701 and 702 as a different color in piles.

[0023]

[Effect of the Invention] Since the exposure layout with the graphic form in which the actual exposure field restricted by the masking blade is shown was displayed according to this invention as explained above, an operator can grasp easily how an actual exposure field is arranged. Therefore, certain and efficient operation can be performed and the effectiveness of semiconductor device manufacture can be raised.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] This invention relates to the semi-conductor aligner and the device manufacture approach which can be burned in a circuit pattern with a step-and-repeat method on a wafer.

[Translation done.]

PRIOR ART

[Description of the Prior Art] In the semi-conductor aligner which can be conventionally burned with a step-and-repeat method on a semi-conductor wafer in the circuit pattern on a reticle, Although various parameters required to perform an exposure job are loaded from an auxiliary storage unit, or an operator inputs or corrects these parameters and a job is performed according to the parameter, in that case, the exposure layout which shows how each shot location is arranged on a wafer is displayed on a display, and an operator can check an exposure layout by this. And this exposure layout is displayed based on the wafer size in a job parameter, X and the step pitch of the direction of Y, the shots per hour of the direction of a low column, etc. as a graphic form with arrangement of each shot in a grid pattern.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] Since the exposure layout with the graphic form in which the actual exposure field restricted by the masking blade is shown was displayed according to this invention as explained above, an operator can grasp easily how an actual exposure field is arranged. Therefore, certain and efficient operation can be performed and the effectiveness of semiconductor device manufacture can be raised.

[Translation done.]

·TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since the exposure field in each actual shot is restricted according to the opening condition of a masking blade, the above-mentioned thing in a grid pattern divided with a step pitch may necessarily be unable to be called what reflected each exposure field correctly. Therefore, there is a problem that the situation of differing from what is expected from the exposure layout displayed on the display, and the thing which can actually be burned considerably may arise.

[0004] In view of the trouble of such a conventional technique, in a semi-conductor aligner or the device manufacture approach using it, the purpose of this invention enables it to display the exposure layout which shows an actual exposure field correctly, has it, and it is to make certain and efficient operation possible rather than it can set to semiconductor device manufacture.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to attain this purpose, the equipment of this invention follows a job parameter. An exposure means to project the pattern on a reticle on each exposure field on a wafer, and to expose it with a step-and-repeat method, a masking blade restricting the exposure range, In the semi-conductor aligner equipped with the display means which carries out the graphic display of the exposure layout which shows arrangement of each of said exposure field based on said job parameter It is characterized by a display means being what displays said exposure layout with the graphic form in which the actual exposure field where the exposure range is restricted by said masking blade is shown.

[0006] Moreover, the approach of this invention follows a job parameter. In the device manufacture approach of manufacturing a semiconductor device by carrying out sequential projection and exposing the pattern on a reticle to each exposure field on a wafer with a step-and-repeat method, a masking blade restricting the exposure range It is characterized by performing said exposure, checking, after displaying with the graphic form in which the actual exposure field where said exposure range is restricted in the exposure layout which shows arrangement of each of said exposure field based on said job parameter is shown and checking this.

[0007] The shape of a grid and the exposure layout in a grid pattern corresponding to a step pitch of X and the direction of Y which has a pitch repeatedly is displayed in piles to the exposure layout of said actual exposure field, it can creep [can be,] here, and you may make it display that exposure layout alternatively.

[Translation done.]

·OPERATION

[Function] In this configuration, the auxiliary storage unit memorizes, and it can be loaded at the time of job activation, an operator can edit these parameters, or various job parameters required in order to perform an exposure job can also set them up. And although a grid-like exposure layout can be displayed based on the information about the step pitch in these job parameter, a shots per hour, etc., the exposure layout which shows the condition of the actual exposure field restricted by the masking blade is displayed using the information about the location of each masking blade for example, to a shot core coordinate.

[0009] Thus, before the screen of the exposure layout displayed starts exposure, it is suitably referred to after exposure initiation, and thereby, an operator can recognize correctly the condition of actually being exposed and can manufacture the semiconductor device by certain and efficient operation.

[Translation done.]

EXAMPLE

[Example] Drawing 1 is the perspective view showing the appearance of the semi-conductor aligner concerning one example of this invention. As shown in this drawing, this semi-conductor aligner is arranged to the temperature control chamber 101 which performs environmental temperature control of the body of equipment, and its interior. In the EWS body 106 and row which have CPU which controls the body of equipment In the display unit 102 for EWS and the body of equipment which display the predetermined information in equipment It has the console section containing the control panel 103 for performing a predetermined input to the monitor TV 105 which displays the image information obtained through an image pick-up means, and equipment, and the keyboard 104 grade for EWS. For an emergency stop switch and 109, as for a LAN telecommunication cable and 111, 110, such as various switches and a mouse, is [107 / an ON-OFF switch and 108 / the jet pipe of generation of heat from a console function and 112] the exhausters of a chamber among drawing. The body of a semi-conductor aligner is installed in the interior of a chamber 101.
[0011] The display 102 for EWS is a thing thin flat type [, such as EL, plasma, and liquid crystal,], is dedicated to chamber 101 front face, and is connected with the EWS body 106 by the LAN cable 110. A control panel 103, a keyboard 104, and monitor TV105 grade are also installed in chamber 101 front face, and enable it to have performed the same console actuation as usual from chamber 101 front face.
[0012] Drawing 2 is drawing showing the internal structure of the equipment of drawing 1 . The stepper as a semi-conductor aligner is shown in this drawing. Among drawing, a reticle and 203 are wafers, and 202 can imprint the pattern on a reticle 202 in the sensitization layer on a wafer 203 with the projection lens 206, when the flux of light which came out of light equipment 204 illuminates a reticle 202 through the illumination-light study system 205. The reticle 202 is supported by the reticle stage 207 for holding a reticle 202 and moving. A wafer 203 is exposed after vacuum adsorption has been carried out by the wafer chuck 291. The wafer chuck 291 is movable to each shaft orientations by the wafer stage 209. The reticle optical system 281 for detecting the amount of location gaps of a reticle is arranged at the reticle 202 bottom. The projection lens 206 is adjoined above the wafer stage 209, and the off axis microscope 282 is arranged. It is a main role that the off axis microscope 282 performs relative-position detection with an internal reference mark and the alignment mark on a wafer 203. Moreover, these stepper body is adjoined, the reticle library 220 and the wafer carrier elevator 230 which are a peripheral device are arranged, and a required reticle and a required wafer are conveyed by the reticle transport device 221 and the wafer transport device 231 at a stepper body.
[0013] The chamber 101 consists of a filter box 213 which filters the air-conditioning cabin 210 and minute foreign matter which mainly perform temperature control of air, and forms the uniform flow of clarification air, and a booth 214 which intercepts an equipment environment with the exterior. Within a chamber 101, the air by which temperature control was carried out at the condensator 215 and the reheat heater 216 in the air-conditioning cabin 210 is supplied in a booth 214 through an air filter g by the blower 217. From the return opening ra, the air supplied to this booth 214 is incorporated again in the air-conditioning cabin 210, and circulates through the inside of a chamber 101. Usually, strictly, this chamber 101 has introduced the air outside the booth 214 of about ten percent of circulating air volume through a blower from the open air inlet oa in which it was prepared in the air-conditioning cabin 210 in order to always maintain the inside of not the perfect circulatory system but the booth 214 at positive pressure. Thus, it makes it possible for a chamber 101 to keep constant the environmental temperature on which this equipment is put, and to maintain air at clarification. Moreover, in preparation for cooling of an ultrahigh pressure mercury lamp, or toxic gas generating at the time of laser abnormalities, Inlet sa and an exhaust port ea are established in light equipment 204, and the forcible exhaust air of a part of air in a booth 214 is carried out via light equipment 204 at the plant through the ventilating fan of the dedication with which the air-conditioning cabin 210 was equipped. Moreover, it connected with the open air inlet oa and the return opening ra of the air-conditioning cabin 210, respectively, and they are equipped with the chemisorption filter cf for removing the chemical in air.
[0014] Drawing 3 is the block diagram showing the electrical circuit configuration of the equipment of drawing 1 . In this drawing, 321 is the body CPU which manages control of the whole equipment and which was built in said EWS body 106, and consists of arithmetic and program control, such as a microcomputer or a minicomputer. 322 -- for a reticle stage driving gear and 325, as for a shutter driving gear and 327, the illumination system of said light equipment 204 grade and 326 are [a wafer stage driving gear and 323 / the alignment detection system of said off axis microscope 282 grade, and 324 / a focal detection system and 328] Z driving gears, and these are controlled by the body CPU 321. 329 is the conveyance system of said reticle transport device 221 and wafer transport-device 231 grade. 330 is a console unit which has said display 102 and keyboard 104 grade, and is for giving various kinds of commands and parameters about actuation of this aligner to a body CPU 321. That is, it is for delivering and receiving information among operators. It is external memory 331 remembers Console CPU and 332 remembers the parameter of various jobs

etc. to be. The mask to be used, opening of a masking blade, light exposure, layout data, etc. are contained in a job parameter.

[0015] Drawing 4 is drawing showing the concept of the exposure layout display in the job selection screen displayed on the display 102 in the equipment of drawing 1 , and drawing 5 is a flow chart which shows the processing at the time of executing a job selection command. With reference to these drawings, the actuation at the time of job selection is explained.

[0016] When a job selection command is directed in the actuation screen of the high order displayed on the display 102, in step S501, it switches to the job selection screen 401, and consoles CPU 331 are Jobs A, B, and C. -- A list is displayed. Next, in step S502, if it judges [of the jobs A and B under list, and C--] whether directions of one of jobs are made inside, or a scroll button 410 is directed and there are directions of a job, it will shift to step S503. When a scroll button 410 is directed, return and a job list are scrolled to step S501. These directions can be performed a mouse, a keyboard, or by touching, when a display has a touch screen.

[0017] At step S503, it is based on the layout data in the job parameter corresponding to the job which was read from external memory 332 and which was directed in step S502, and the data about opening of a masking blade, and they are the job lists A, B, and C about the exposure layout 405. -- It displays on a left. Layout data include information, such as a main coordinate of each [the step size of X and the direction of Y, a total shots per hour and] shot, and wafer size.

[0018] Next, in step S504, it judges whether the load carbon button 411 is directed, when the load carbon button 411 is directed, it shifts to step S506, and when a scroll button 410 is operated, it returns to step S501 and a job list is scrolled. At step S506, the parameter of the job directed at step S502 is loaded to memory 403 from a hard disk 332. And at step S506, when it judges whether the termination carbon button 412 is directed and this is directed, a job selection command is ended and it returns to the actuation screen of a high order. When a scroll button 410 is operated, it returns to step S501. Thus, two or more job parameter 406,407 -- can be loaded, checking an exposure layout.

[0019] On the actuation screen of a high order, commands, such as starting of the job (exposure processing) based on the loaded job parameter, can be directed. Starting of a job transmits a required job parameter to the memory 402 of Body CPU.

[0020] Drawing 6 is a flow chart which shows the layout display processing in step S503 of the flow chart of drawing 5 . layout display processing is shown in drawing 6 -- as -- first -- step S601 -- setting -- an exposure layout -- A, B, and C -- the input for specifying whether it displays with which display mode is accepted. Mode A is the mode which displays the exposure layout 701 of the shape of a grid corresponding to the step pitch of X and the direction of Y which has a pitch repeatedly, as partially shown in drawing 7 . Mode B is the mode which displays the exposure layout 702 with the graphic form corresponding to the actual exposure field to which the exposure range was restricted by the masking blade. Moreover, Mode C is the mode which displays these exposure layouts 701 and 702 in piles.

[0021] Next, in step S602, it judges any of A, B, and C the specified display modes are, and in the case of Mode A, it progresses to step S603, and it displays the exposure layout 701 based on step size, total shots-per-hour, and wafer size etc. Moreover, in the case of Mode B, the exposure layout 702 is displayed based on the data about the main coordinate of each shot, and opening of a masking blade etc. In the case of Mode C, the exposure layouts 701 and 702 are displayed in piles. The data about opening of a masking blade show the distance from the shot core to each of four blades which form rectangular opening and restrict the exposure range of X and the direction of Y.

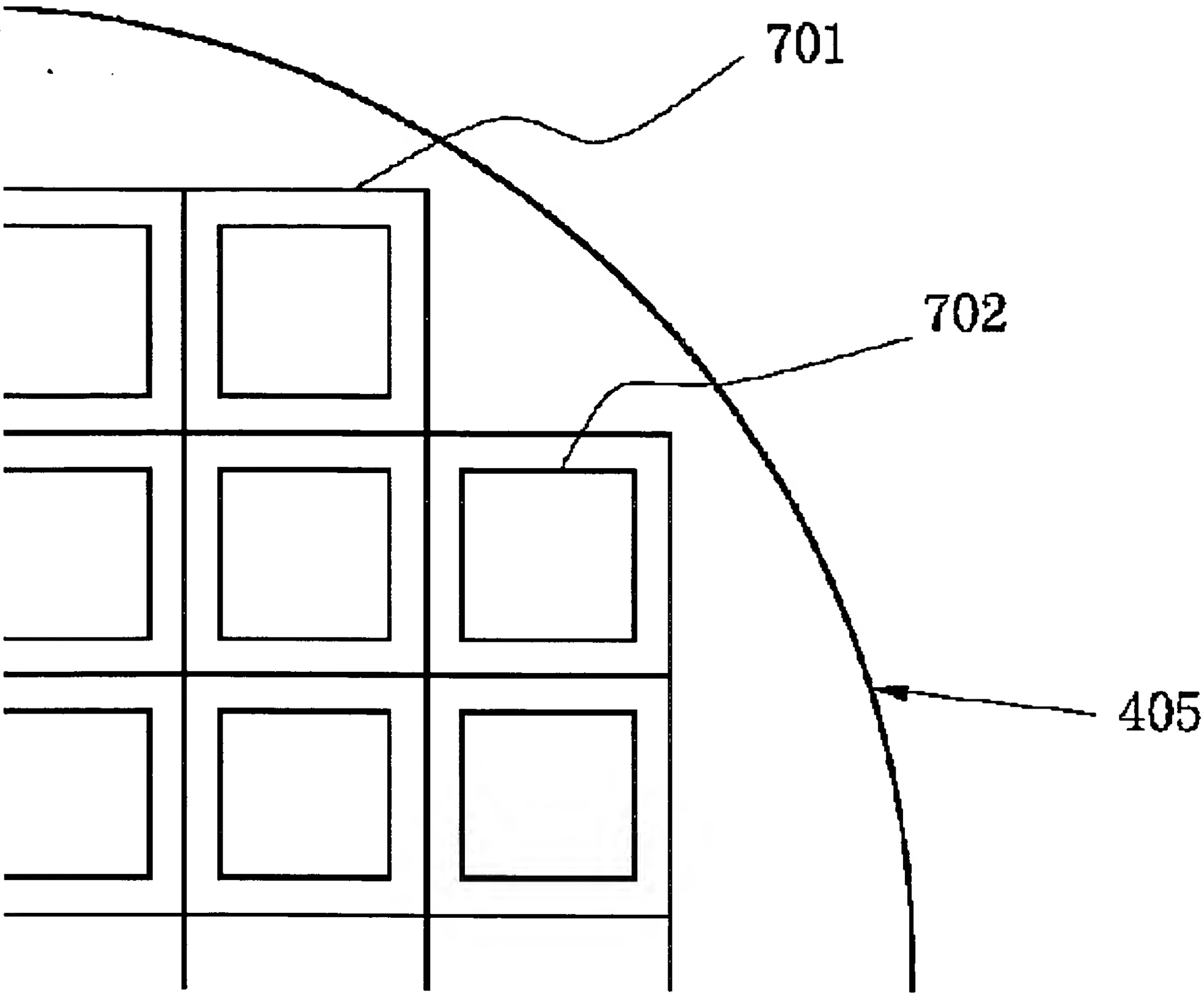
[0022] In addition, the exposure layouts 701 and 702 are changed to arbitration, and you may make it display them based on directions of an operator. Moreover, when color display is possible, you may make it express the exposure layouts 701 and 702 as a different color in piles.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the appearance of the semi-conductor aligner concerning one example of this invention.
[Drawing 2] It is drawing showing the internal structure of the equipment of drawing 1 .
[Drawing 3] It is the block diagram showing the electrical circuit configuration of the equipment of drawing 1 .
[Drawing 4] It is drawing showing the concept of the exposure layout display in the job selection screen in the equipment of drawing 1 .
[Drawing 5] It is the flow chart which shows the processing at the time of executing a job selection command in the equipment of drawing 1 .
[Drawing 6] It is the flow chart which shows the layout display processing in the flow chart of drawing 5 .
[Drawing 7] It is the partial diagrammatic view of the exposure layout displayed in processing of drawing 6 .
[Description of Notations]
A temperature control chamber, the display unit for 102:EWS, 103 : 101: A control panel, 104 The keyboard for EWS, 105 : [Monitor TV, a 106:EWS body,] 107: An ON-OFF switch, a 108:emergency stop switch, 109 : Various switches, A 110:LAN telecommunication cable and 111:jet pipes, such as a mouse, 112 : An exhauster, 202 : A reticle, a 203:wafer, 204:light equipment, a 205:illumination-light study system, 206: A projection lens, a 207:reticle stage, 209 : A wafer stage, 281: A reticle microscope, a 282:off axis microscope, 210 : An air-conditioning cabin, 213 : A filter box, a 214:booth, a 217:blower, g:air filter, cf: A chemisorption filter, oa:open air inlet, ra:return opening, 312 : A keyboard, 321: Body CPU, a 330:console, 331 : Console CPU 332 : External memory, a 401:job selection screen, 402,403:memory, 405: The grid-like exposure layout by an exposure layout, a 406,407:job parameter, the 410:scroll button, the 411:load carbon button, the 412:termination carbon button, and 701:step pitch, 702: The exposure layout corresponding to a masking blade.

[Translation done.]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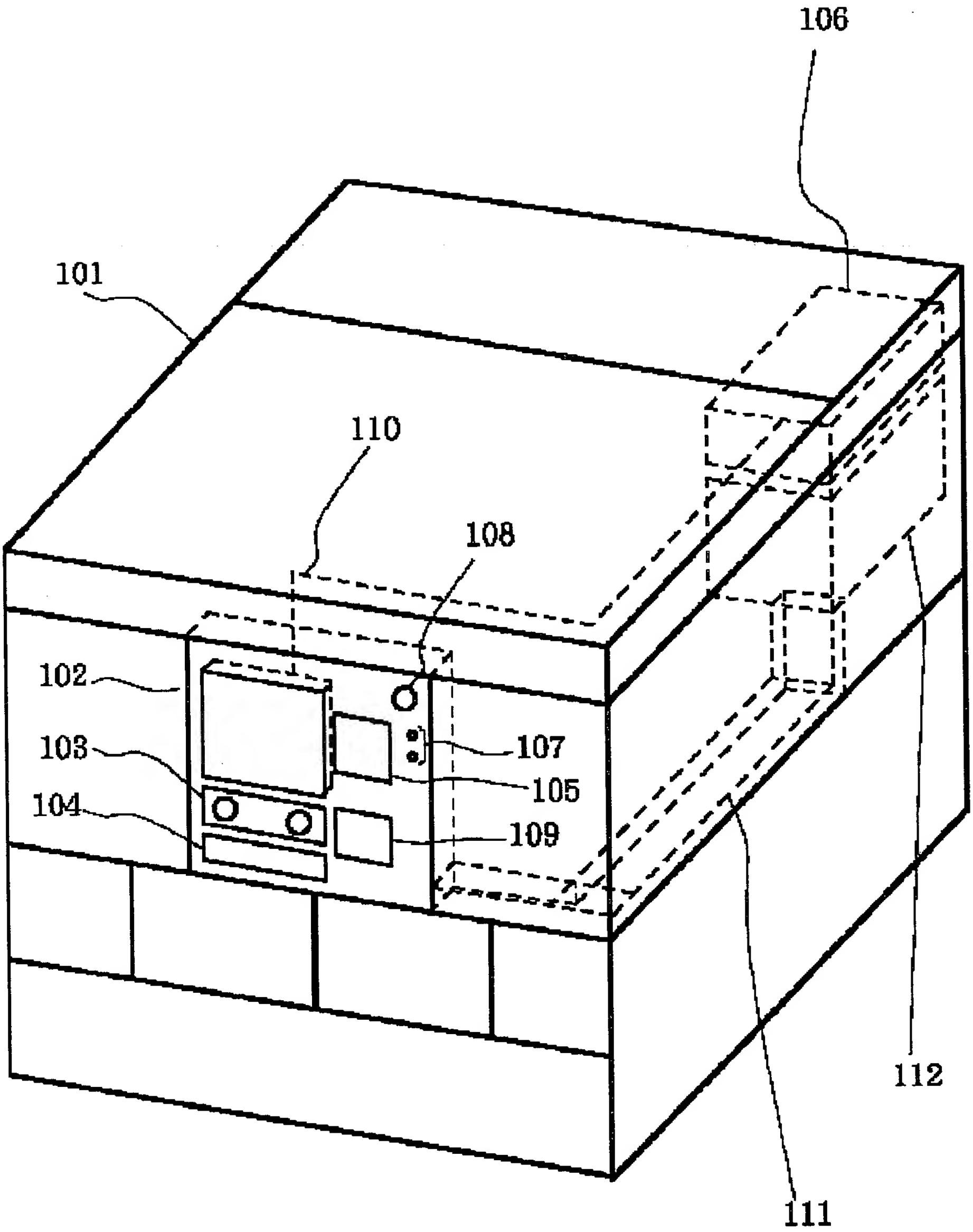
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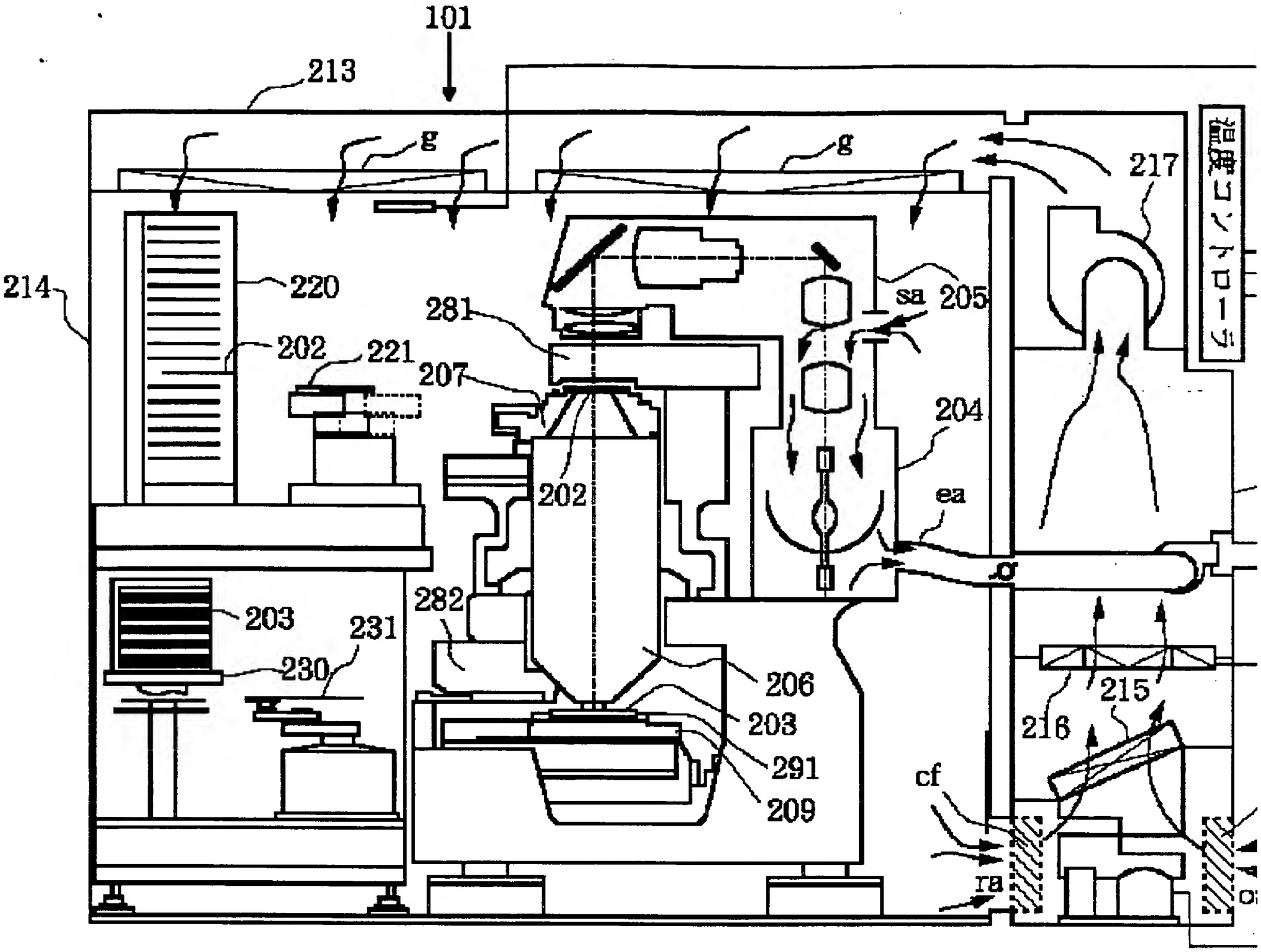
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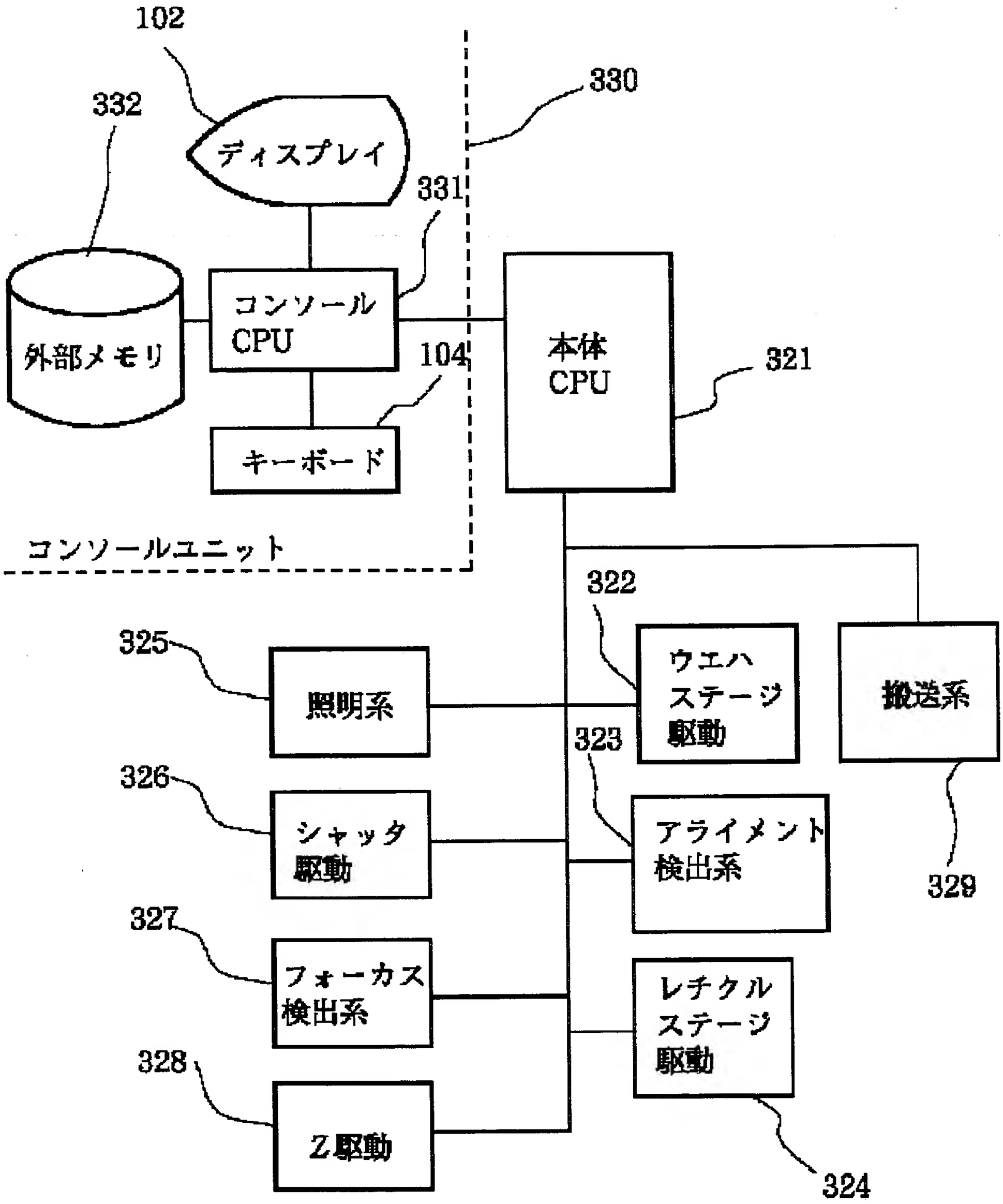
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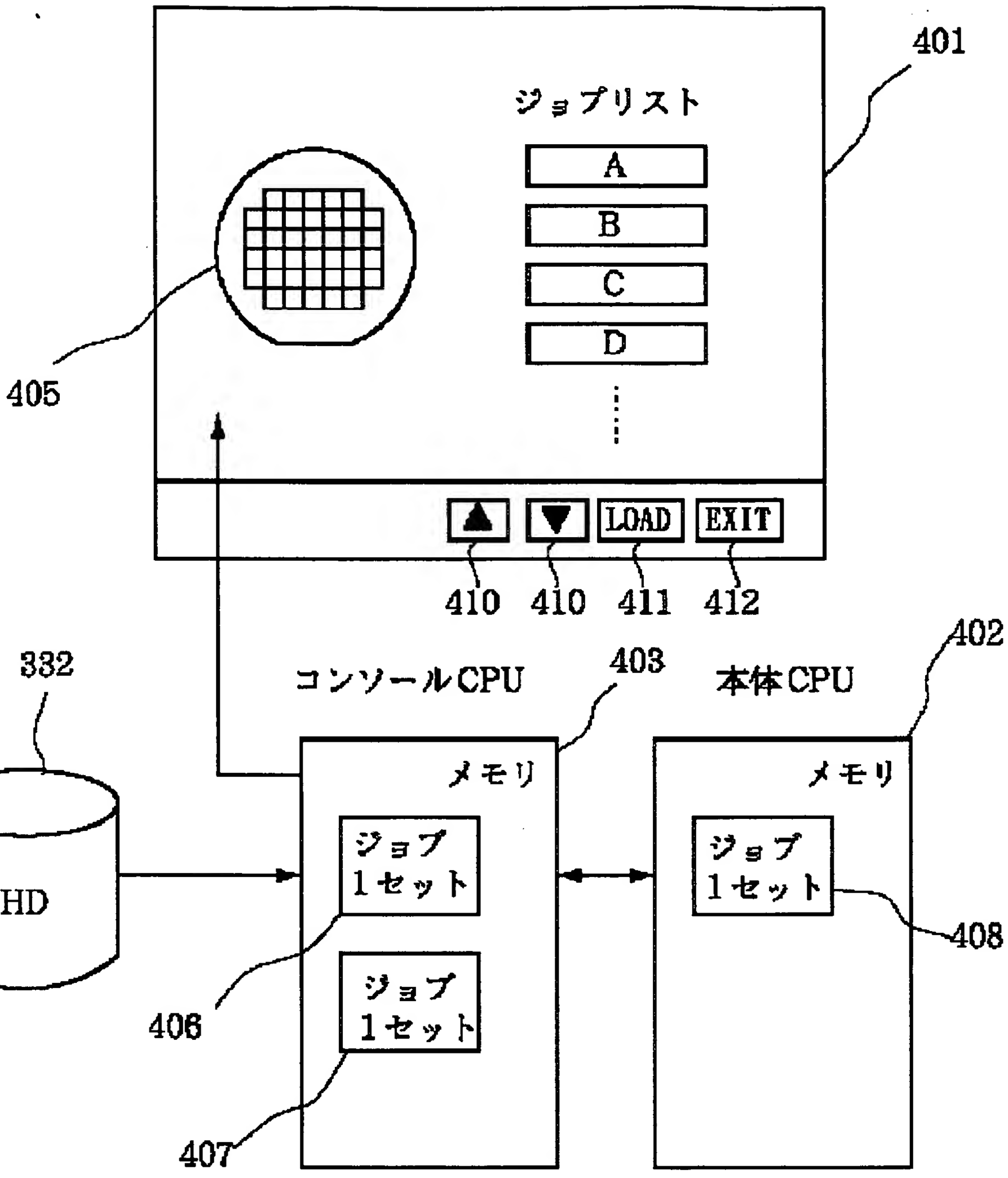
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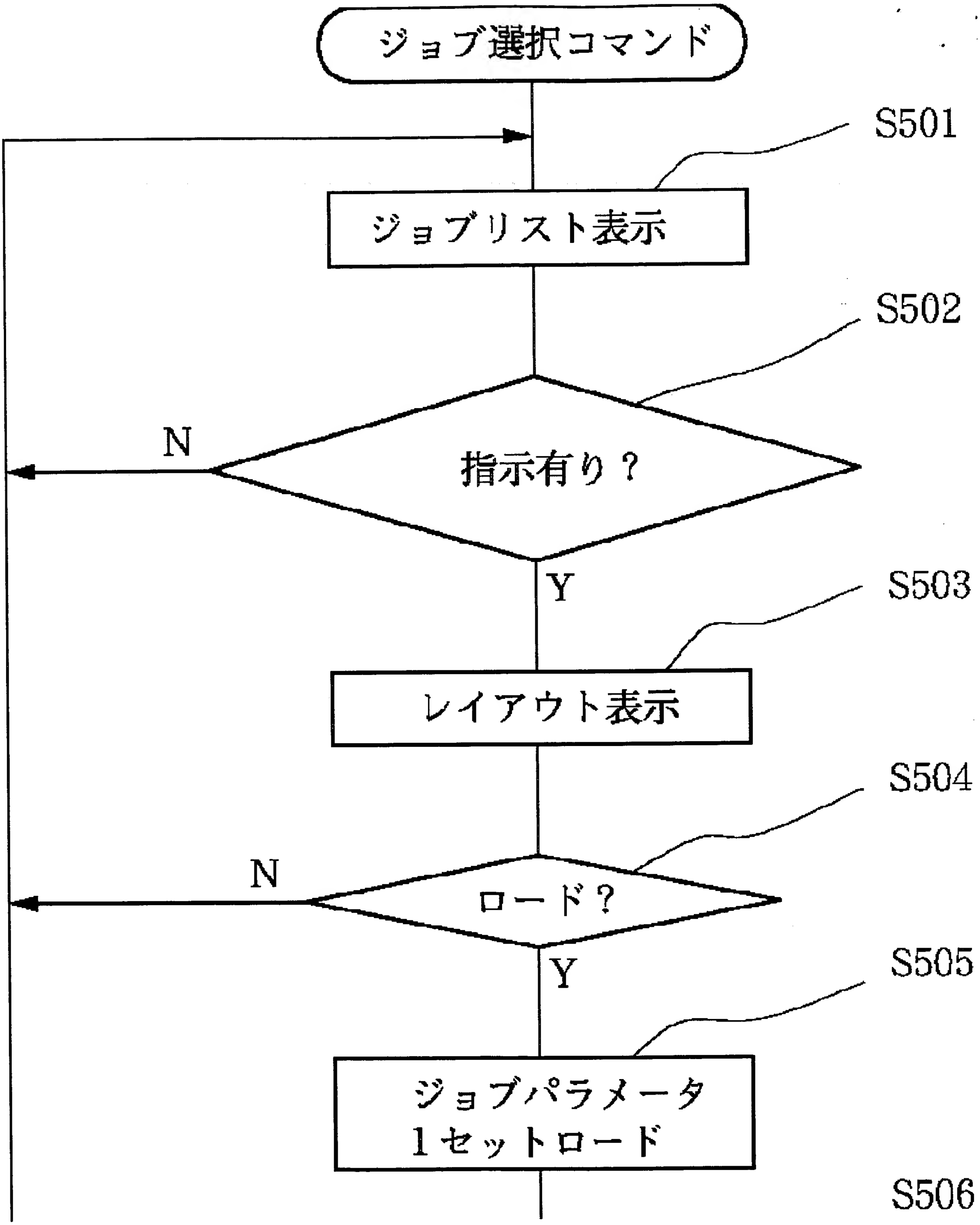
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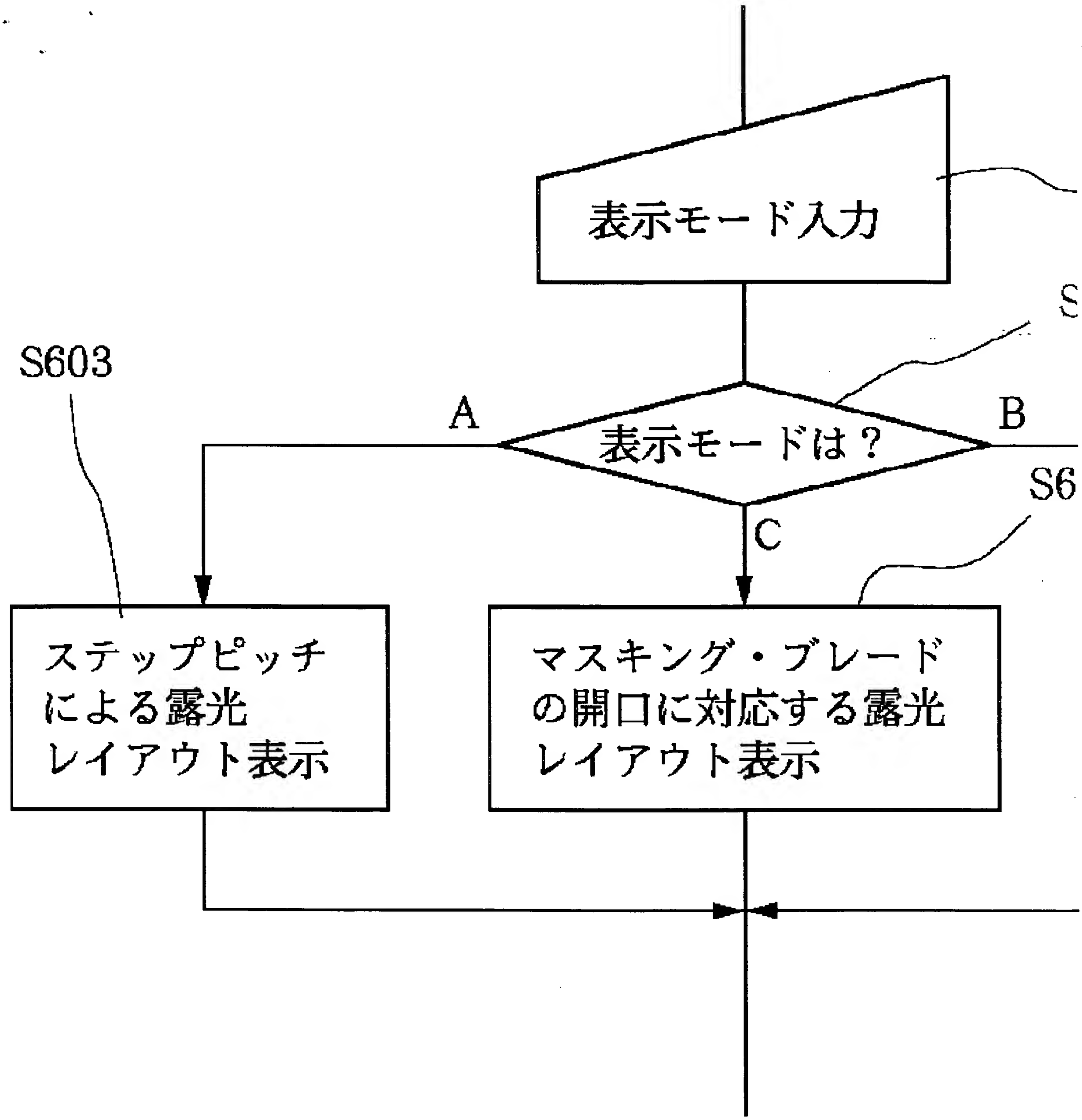
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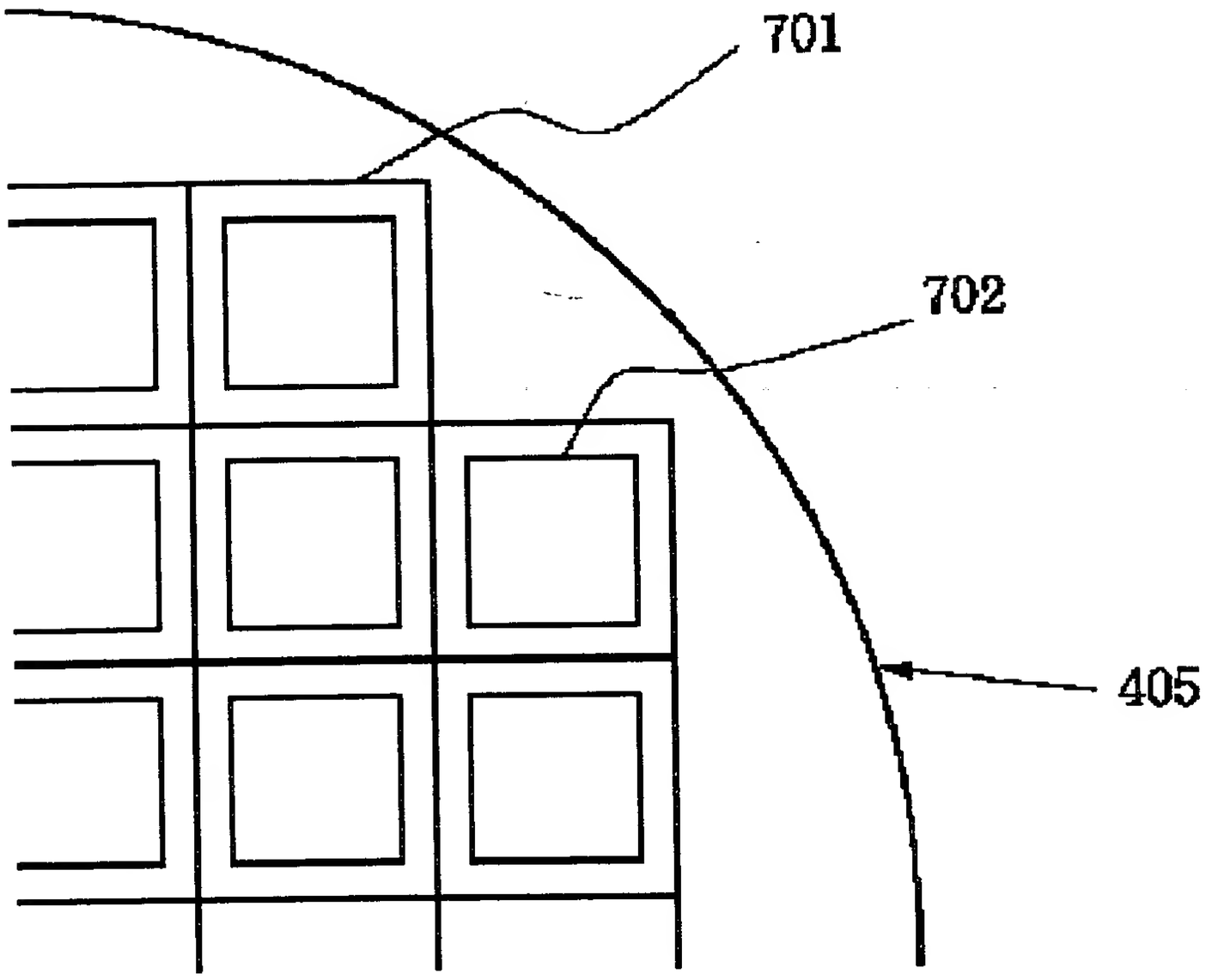
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